PPK Kit Phantom4 *v3.0*

Convert your Phantom 4 Pro v.1 / v.2 / Advance into a PPK system.
Easy integration without the need to open or modify your Drone.
International shipments.

Description

The PPK-Kit-Phantom4 is a non-intrusive adapter system to connect an Emlid Reach M2 or M + GNSS receiver (not included) to a DJI Phantom 4 Pro or Advance Drone model.

Main Advantages:

- Works with Emlid Reach M2 and M + modules (not included)
- No need to open or modify the Drone
- KiT attaches and disattaches in seconds
- No batteries required
- Ultra-fast image-firing detector sensor
- Lightweight micro electronics: 70 grams.

An externally installed sensor on the Drone detects the shot of each photograph and records a timestamp in the Reach M2 / M + module's log file. Timestamps are extracted from the module after the flight and added to the images taken in flight as metadata such as centimeter precision geotags using various specialized software options available on the market.

The Emlid Reach M2 and M + modules (not included in the Kit) are multi-band / single-band GNSS systems respectively, with centimeter precision for UAV mapping.

Image: Reach M2 and Antenna Module. (Not included in the kit)

Operation requirements

For integration requires:

1. A **PPK Kit Phantom4**
2. A Drone: Phantom 4 Pro v.1 / v.2 or Phantom 4 Advance (Not included)
3. An Emlid Reach M2 or M + with GNSS Antenna (Not included)
4. A RiNEX compatible GPS Base Receiver (Not included)

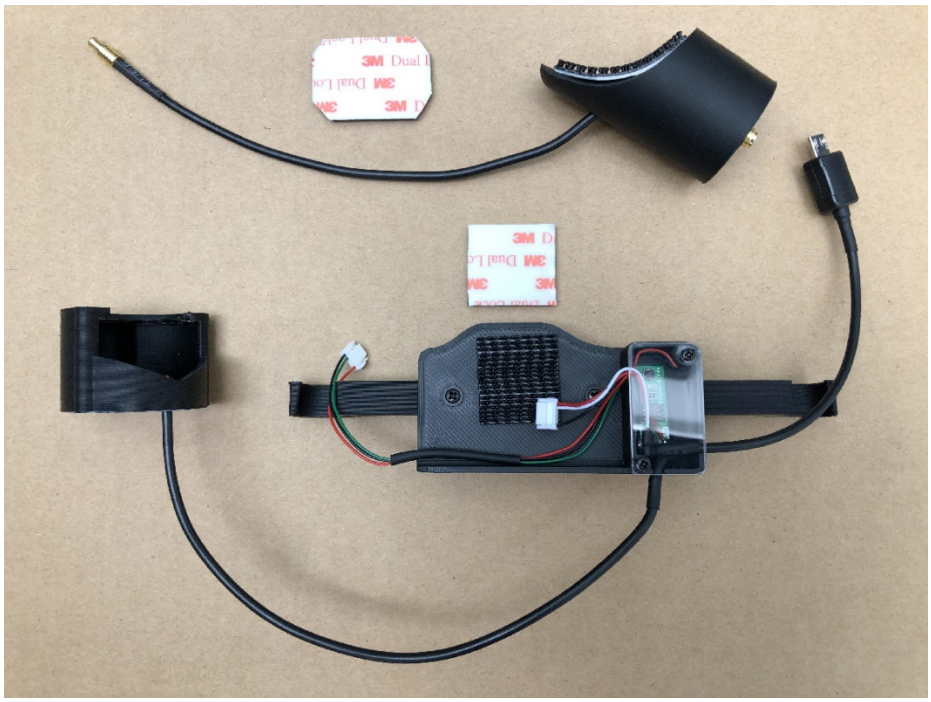

Image: Kit components.

Kit Components:

1. **Antenna support** with short connection cable and high resistance velcro
2. **M2 / M + Module** holder with power regulator, Micro-USB cable for power-up and heavy duty 3M Velcro
3. **Photo Trigger Sensor** attached to the module support

Installation

1. Glue one side of the velcro to the center back of the M2 / M + module.
2. Connect the 6-pin connector of the M2 / M + bracket to the **S1** connector of the M2 / M + module.
3. Connect the 5-pin connector of the Photo Trigger Sensor to the **C1** connector of the M2 / M + module.
4. Using the velcro, firmly place the M2 / M + module on the Module Holder.
5. Install the M2 / M + Bracket on the bottom of the left landing gear of the Drone, using the two lugs on the crossbar. To do this, first insert one of them and then slide the crossbar upwards, until the other handle can also be easily inserted.
6. Plug the Micro-USB cable into the USB slot of the Drone.

7. Remove the clear plastic Clip located at the end of the left front arm of the Drone.

Image: Plastic clip removed from the Drone arm.

8. Carefully insert the Trigger Sensor under the motor of the Drone's left front arm.
9. Install the GNSS antenna on the Antenna Bracket using the short connector cable provided. Before screwing the connector to the antenna, unscrew the supplied fixing nut and save it.

Image: Unscrewed nut before antenna installation.

10. Firmly attach the Antenna Mount to the top of the Drone using the Velcro provided. The correct installation position of the antenna mount is just above the location of the Drone camera. Once placed, check that the propellers of the Drone when turning do not touch the support: it is enough to have a safety margin of five millimeters.
11. Connect the antenna cable to the M2 / M + module. Be careful not to block the view of the Drone's anti-collision system. In the case of using the long connection cable provided by Emlid, wrap the antenna cable around the bracket and secure it in place with a tie wrap.

Drone Configuration

1. Turn on the Drone Phantom 4 Pro or Advance and the remote control.
2. Enter the DJI GO 4 App and activate the front lights of the Drone arms: Settings / MC Settings / Advanced Settings / Turn on Aircraft Arm LEDs.

M2 / M + module Configuration

Reachview 3 App and Firmware Update

1. Download and Install the ReachView 3 App on your iOS / Android Cellphone or Tablet.
2. When starting the application for the first time you need to update to the latest Firmware. To do this: Disable mobile data on Android phones while using ReachView 3.
3. Power on your Reach M2 / M + module.
4. In the Wi-Fi settings of your mobile device: connect to the access point of the M2 / M + ("reach: XX: XX"). The initial password is: emlidreach
5. Launch the ReachView 3 application and select your M2 / M + module.
6. Select the "+" symbol to add your Wi-Fi network to the list of available networks.
7. Enter your Wi-Fi network information.
8. Restart the M2 / M + module.
9. Re-connect your mobile device to your Wi-Fi Network.
10. Refresh the ReachView application 3. The M2 / M + module will now have a local IP address (192.168.1.XXX)
11. Update ReachView 3 (M2 / M + firmware will be updated). Restart the M2 / M + when done.
12. Restart the ReachView 3 application and connect to the M2 / M + module. You can now view the status of the satellite connection, download logs, and make changes to the M2 / M + configuration.

Settings on the M2 / M +

1. Go to **REACHVIEW 3 > RTK SETTINGS** and in the **GNSS SELECT** section select GPS, GLONASS and other GNSS systems that, according to the geographic location of your project, suit you.
   1.1. **IN THE M + MODULE:** Due to the limitations of this module in the data capture speed, the following selection combinations can be made:

Selección de GNSS	Frecuencias permitidas
GPS + GLONASS + GALILEO + SBAS + QZSS	1 Hz
GPS + GLONASS + QZSS	5 Hz
GPS + GALILEO	5 Hz
GPS	10 Hz

   It is recommended to set the refresh rate to 5 Hz and keep the GPS + GLONASS + QZSS selection. Do this for both the Drone / Rover and the Ground Base when using the Reach RS + Base.
   1.2. **EN EL MÓDULO M2:** The M2 version tracks GPS, GLONASS, GALILEO, QZSS and BEIDOU satellite systems. Data can be recorded with a refresh rate of 1 Hz, 5 Hz, or 10 Hz.
   For a drone flight, set the refresh rate to 10 Hz.

Do this for both the Drone / Rover and the Ground Base when using the Reach RS2 base.

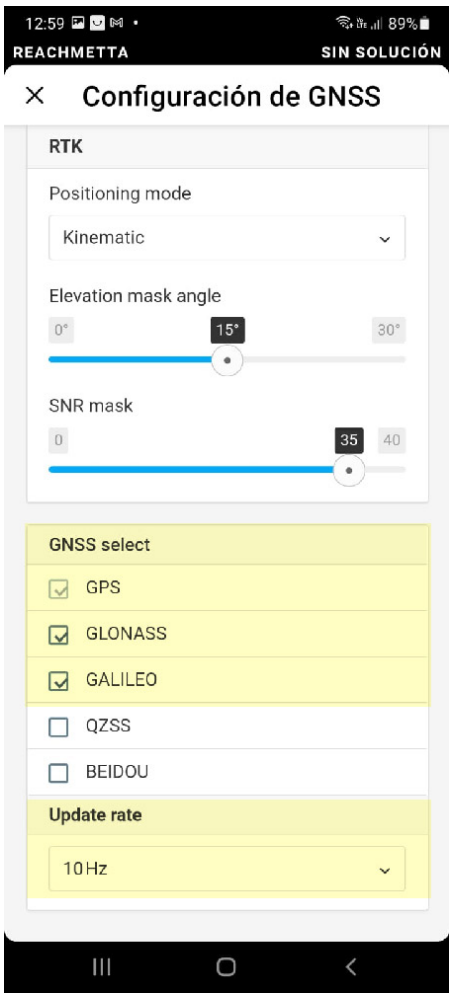

Imagen: Pantalla de Configuración de GNSS con satélites seleccionados y frecuencia de 10Hz.

2. Go to **REACHVIEW 3> LOGGING** and enable **RAW DATA** with **UBX**. **It is recommended to activate the option to start automatic registration (Autostart)**: the UBX registration will start each time the module is successfully powered up.
   Image: Registration screen with the Autostart function activated and recording in UBX format.
3. Go to **REACHVIEW 3> CAMERA CONTROL** and manually take a photo using the Photo Shoot button located on the remote control of the Drone Phantom 4. The value in the **CAMERA EVENTS: LAST TIME MARK** field should update at this time. You can take several photos to verify the proper functioning of the Time Stamp capture and registration system.

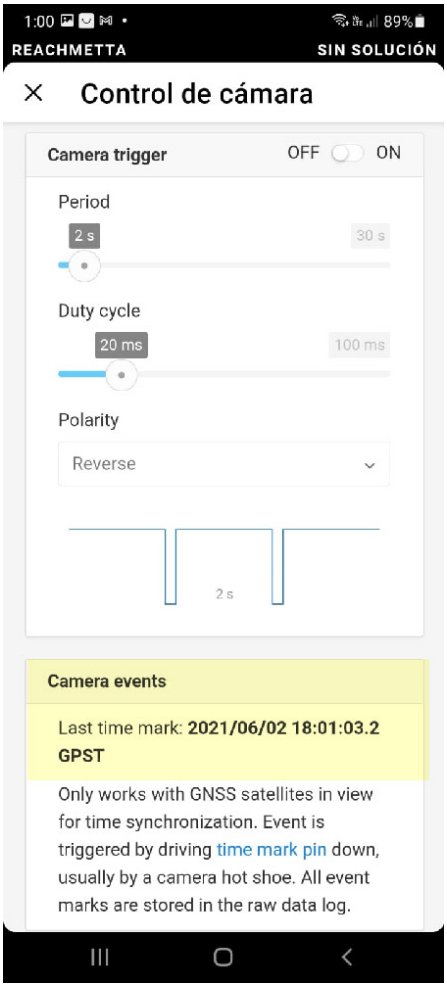

Image: Camera Control screen with trigger event time detected by the sensor.

4. Now the M2 / M + module is ready to operate.

Topographic Survey Flights

Before Flight:

1. Program your flight plan following the instructions of the flight control application you use: DJI GS Pro, Pix4D, DroneDeploy, MapsMadeEasy or others.
2. Connect the previously installed PPK KIT by connecting the Micro-USB cable to the Drone.
3. Turn on the Drone Phantom 4 Pro / Advance.
4. Wait for the three lights on the M2 / M + to come on: Orange, Blue and Green. It takes about 30 seconds to wait for the Blue (Wifi) and Green (Satellites) lights.
5. In the event that at the first start of the Drone the M2 / M + module does not turn on completely (only orange light on) do the following: disconnect and reconnect the 6-pin connector directly from the M2 / M + module without turning off the Drone. This happens due to slight variations in power performance in some Drone batteries due to time of use (low amperage) or other factors external to the kit.
6. Connect to the M2 / M + via Wi-Fi *(See point 6 of the section: M2 / M + module configuration: Reachview 3 App and Firmware update)*.

7. Take a manual photograph to verify the correct registration of the Time Stamp **(CAMERA EVENTS: LAST TIME MARK)**.
8. Start or verify the start of GNSS data logging **(RAW DATA / UBX)** on the M2 / M +.
9. Once these verifications and recommendations have been made, you can proceed to fly the Drone and take photos.

   IMPORTANT RECOMMENDATION: It is recommended, at the end of each flight plan, to take a photograph with the Drone camera placed on a Ground Control Point (with the camera located over the central point of the same) using the Shutter button on the Phantom remote control Four.

After Flight:

1. At the end of each flight, disable the UBX log recording using the ReachView 3 App. Before turning off the M2 / M + wait until the log processing is complete.
   Note: Make sure the GNSS data (.UBX file) has been saved correctly.
2. Download the data logs (RAW DATA LOGS - UBX) from the M2 / M +. To do this, in the ReachView App, press the download buttons for each log, in the **REACHVIEW > LOGGING** section.
   Find the UBX file in your mobile device's file system and email it. Then retrieve it on your PC for further processing.
   The UBX file will be inside a .ZIP folder. Save it and unzip it for use.

As a result of the flight session and in order to perform a correct processing in PPK, you must obtain the following data set:

1. Photos captured by the Phantom 4
2. RAW LOGS UBX of the M2 / M + module of each flight performed
3. RAW LOGS (UBX or RINEX) from a ground-based GNSS receiver
4. List of Control Point coordinates

With this information, you will be ready to process the data through different photogrammetric software options.

Post Process - PPK

The final PPK (Post Processed Kinematic) mapping workflow can be performed using the following software options. Each of them has its own steps to follow at the user's choice. This is a list of post-process programs according to their degree of difficulty and knowledge requirement in topography:

1. Toposetter 2.0 Pro (Trial Version / Paid Version)
2. REDtoolbox (Trial Version / Paid Version)
3. RTKLIB (Free Version)

Once the information is processed, you can import the image set into any mapping software, such as Agisoft Metashape, DroneDeploy, Pix4D and others of your choice.